

Name Key

$$a_n = a_1 + (n-1)d$$

$$S_n = \frac{n}{2}(a_1 + a_n)$$

$$S_n = \frac{n}{2}[2a_1 + (n-1)d]$$

Date _____

Arithmetic Word Problems

1. The Joneses have a variable rate mortgage loan from a savings bank, which has a monthly payment of \$460 during the first year. If the monthly payment were to increase by \$25 per year for each succeeding year of the life of the loan, what would their monthly payment be during the twelfth year?

$$a_{12} = 460 + (12-1)25$$

$$\$735$$

2. The Walkers' tomato patch produces 14 tomatoes on the first day of the season and 9 more on each succeeding day. How many tomatoes will the plants yield on the fifteenth day of the season? How many tomatoes total would they have yielded by the 30th day of the season?



$$a_{15} = 14 + (15-1)9$$

140 tomatoes

$$S_{30} = \frac{30}{2}[2(14) + 29 \cdot 9]$$

4335 tomatoes

3. Each row of bricks on a wall is made up of 1.5 fewer bricks than the preceding row. If the bottom row of bricks is made up of 67 bricks, how many bricks will be needed in the 16th row? If the top row of bricks consists of a single brick, how many rows will there be? How many bricks are used in the wall?



$$a_n = 67 + (n-1)(-1.5)$$

$$44.5 \text{ bricks}$$

$$1 = 67 + (n-1)(-1.5)$$

$$45 = n \text{ rows}$$

$$S_{45} = \frac{45}{2}(67 + 1)$$

$$= 1530 \text{ bricks}$$

4. Between March 1st and March 31st, the sunrise at 40° North Latitude occurs about 1.6 min earlier each day than the preceding day. If the sun rose at 6:33 AM on March 1st, at what time did it rise on March 21st? On what day did it rise at 5:53 AM?



$$a_{21} = 0 + 20(-1.6)$$

$$= -32$$

$$6:01 \text{ AM}$$

$$-40 = 0 + (n-1)(-1.6)$$

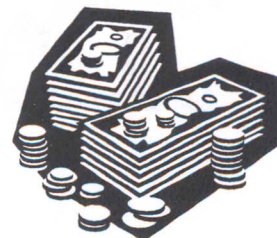
$$26 = n$$

$$3/26$$

5. Suzanne owns 100 shares of the HYM company. Each share is worth \$35. Suzanne expects the value of a share to increase by \$1.80 each year. How much will each share be worth in the 20th year?

$$a_{20} = 35 + (20-1)(1.80)$$

$$\$69.20$$



6. A potato farmer gathers 35 bushels of potatoes on the first day of the harvest. The farmer estimates that on each successive day of the harvest the number of bushels will increase by 4. If the harvest lasts 14 days, what is the total number of bushels the farmer will collect?

$$S_{14} = \frac{14}{2} [2(35) + 13 \cdot 4]$$

$$= \boxed{854 \text{ bushels}}$$

$$a_1 = 12,000$$

$$d = 800$$

7. At the end of the first year of operation, Dennis' garage produced a gross income of \$12,000. In the following years, this income increased by \$800 per year. After how many years will the gross income be \$22,400?

$$22,400 = 12,000 + (n-1)800$$

$$= 12,000 + 800n - 800$$

$$14 = n \quad \boxed{14 \text{ yrs}}$$



8. During a laboratory observation period it is found that the diameter of a tree increases the same amount each year. If the diameter was 61mm at the end of the 6th year, and 76mm at the end of the 10th year, what was it at the end of the first year?

$$76 = 61 + (10-6)d$$

$$15 = 4d$$

$$3.75 = d$$

$$61 = a_1 + (6-1)(3.75)$$

$$42.25_{\text{mm}} = a_1$$

9. In its original form, the width of the Great Pyramid at Giza decreased by 1.57m for each successive meter of height. If the width was 229.22m measured at a height of 1m, at what height was the width 103.62m? How high was the Great Pyramid?

$$103.62 = 229.22 + (n-1)(-1.57)$$

$$0 = 229.22 + (n-1)(-1.57)$$

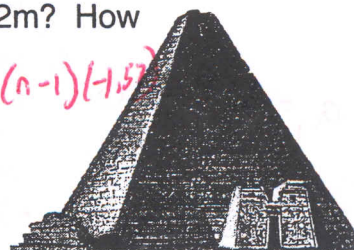
$$-127.17 = -1.57n$$

$$147 = n$$

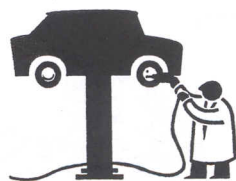
$$81 = n$$

$$\boxed{81 \text{ m}}$$

$$\boxed{\text{Perhaps } 146 \text{ m}}$$



10. Kerri drove her car 8400km during the first year she owned it. In each successive year, she drove the car 750 km more than she did the previous year. During the first year, the car cost \$0.12 per km to run; the cost per km increased by \$0.02 each year. How much did it cost Kerri to run her car in its 7th year?



$$a_7 = 8400 + (7-1)(750)$$

$$12900 \text{ km} \quad \times$$

$$\text{Cost}$$

$$a_7 = .12 \times 6(.02)$$

$$.24$$

$$\boxed{\$3096}$$